

# The Top 10 Unanswered Biofuels Questions

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All throughout the year, your questions have been drifting into *Biofuels Digest's* inbox. Job hunting, capital raising, data gathering, policy predicting, technology snooping, bona-fides-checking. Which are the biggest ones yet unanswered?

Your calls and emails are always the highlight of our days. Most questions can be answered Johnny-on-the-spot. Some are still out there and well worth arguing over. Here are the top 10 that are still unanswered.

By the way, we checked as to whether anyone appointed us visionary-of-all-things-yet-to-pass. Didn't get that gig. So, we offer these answers with appropriate humility.

**1.) Subsidies and tax credits.** What's the U.S. Congress going to do? One thing is for sure, we're more sure about winning lottery numbers than we are about the chances of the government developing and sticking to an energy policy for longer than it takes to change an ink cartridge for the next round of bill-printing.

The fact that 73 members of Congress signed a petition opposing the extension of the Volumetric Ethanol Excise Tax Credit (VEETC) ethanol tax credit shows that there is still some outside potential that the VEETC will be renewed in some fashion.

But our friends in DC predict that the VEETC will sunset on December 31, and if anything, replaced by a limited blender pump assistance program to get higher blend ethanol fuels out in the market more.

The biodiesel tax credit? Slightly better chance of survival, but a slim one. Going for biodiesel? It's a less controversial fuel in some circles, and involves fewer gallons

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and dollars. The smart money is betting that it will sunset on December 31 as well.

The cellulosic biofuels tax credit. This \$1.01-per-gallon credit is in effect through 2013. Taking positive steps to eliminate a tax credit is a tax-raising measure, and potentially runs afoul of the Grover Norquist pledge taken by the majority of the Republican caucus to not support any tax-increasing measures.

The U.S. ethanol tariff. Given that the U.S. is exporting massive quantities of ethanol, likely not a provision that is necessary at this time.

**2.) The U.S. Presidential field.** Who's going to win? Good question. But, interestingly, the two most pro-biofuels candidates in the Republican field have been Newt Gingrich and Mitt Romney. So, overall, it has been a good election cycle so far for the biofuels industry.

If Obama, Gingrich or Romney takes home the prize, consider it a bullet dodged, given the energy policy preferences of, say, Rick Perry, Herman Cain, Rick Santorum or Michele Bachman.

**3.) Cellulosic ethanol ... Deployment or debacle?** It's become a popular topic for enterprising journalists in the broader media. Counting the small gallonage of cellulosic ethanol, pointing to the Renewable Fuel Standard (RFS) targets, and laughing and telling jokes about how woeful an instrument that the RFS really is.

But it depends on how you frame the question. Remember, the cellulosic biofuels segment is just a breakout section within the overall advanced biofuels pool. How much RFS-qualifying cellulosic biofuel will be produced in 2012? Less than 10 million gallons. About 490 million gallons short of the original targets set up in 2007.

How much RFS-qualifying advanced biofuels will be produced in 2012? More than 10 billion gallons. About 8 billion over the original 2007 targets, which serves to remind us that when we read an article making super-pointed remarks about the cellulosic biofuels pool, but ignoring the overall advanced biofuels glut, it's generally a writer with an ax to grind.

Focusing on the cellulosic biofuels miss, in the context of the overall biofuels supply, is like saying that a city has a fuel crisis because one gas station has run short.

**4.) Hot geographies.** Well, the first four are easy. Brazil, Brazil, Brazil and Brazil. That's what has been in the news all year.

But let's add a couple of others that have been less well-covered. The soybean oil industry in Argentina remains white hot. Algae in Australia. Indonesia has continued its relentless march towards domination of the palm oil sector, like it or not.

Chile and Korea for seaweed. India could get super-hot again for sugarcane -- so could Angola and Pakistan if they settle their politics. The U.S. Southeast continues to grow in importance in advanced biofuels, given projects from KiOr, Enerkem, Algenol, Bluefire, LS9 and BP, among others. And China, the elephant in the room.

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**5.) Pyrolysis -- for real?** For a long time, there have been two raps on pyro oils. One, they have too much oxygen and are unstable, which leads to two, that they cost too much to upgrade to finished fuel. With projects like Licella in Australia and KiOR in the U.S., we think that pyro's time has finally come.

**6.) Hot feedstocks.** Well, the first four are easy. MSW, MSW, MSW and MSW. Not to mention, in fifth place, municipal solid waste (MSW). Waste is making haste, for sure.

Waste Management and Valero have been investing in Enerkem and Terrabon, among other companies, to bring this feedstock from promise to fruition. Enerkem is getting quite close to having all its ducks in a row on two projects -- one, in Alberta, another in Mississippi. And INEOS Bio will have its first small commercial facility up and running next year, using MSW among other feedstocks.

Other hot ones. Perennially, algae, but it's getting closer. POET and Abengoa are moving towards the groundbreaking of their first two commercial facilities, using corn stover. The big question mark? Will sugarcane bagasse be opened up as a feedstock for advanced biofuels? If companies like Codexis can tease out the glucose from bagasse at everyday low prices, they could become the Wal-Mart of biofuels, selling something to just about everybody.

**7.) Where's algae?** By contrast to the last few years, algae's been comparatively quiet this year. But that's like saying that Lady GaGa didn't release an album. It remains hot as ever, even if the hype-o-meter is showing a downtick, and 2012 could be its biggest year yet with Aurora Algae now in demonstration phase with its technology, and Algenol moving forward strongly, among many in the hunt.

Solazyme, the advanced sugar fermentation company (that happens to use algae to ferment sugars), continues to be the rockiest, hottest company in the biofuels space, shipping fuels and other products out the door as fast as it can make them.

**8.) IPOs -- which have the best chance?** In the queue: Genomatica, Elevance, Fulcrum, Mascoma, BioAmber, Myriant, Ceres and PetroAlgae. OriginOil and some others have smaller offers that would take them to a more senior exchange.

What looks hottest? From the analysts we speak to, the first four: Genomatica, Elevance, Fulcrum and Mascoma. The latter two have helped themselves mightily with massive strategic investor deals in recent weeks. Fulcrum with Waste Management, Mascoma with Valero. The former two are seen as, basically, hot renewable chemical plays with broader markets to play in than some other players in the renewable chemicals space.

All of the IPOs have merits -- but the experts we have consulted say that there is not room, at this time, for all nine to succeed. Hence why PetroAlgae has spun itself strongly toward the feed markets, in search of a strong differentiator.

**9.) Range Fuels, etc. Who's next?** Not every project that the Department of

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Energy (DOE) granted money to, or that received a DOE or USDA loan guarantee, is going to make it in its current corporate structure. That's what we hear. Sources are tight-lipped about the likely casualties. It's not always about failing technology -- some companies simply may benefit from a combination that gives two parties more strength than one.

We'd sure hope, for instance, for Coskata to find a deal with the likes of Rentech, potentially strengthening its front-end gasification performance and its balance sheet.

Purely from a capital point of view, there's a lot more "ask" than "get" in the algae sector and in cellulosic ethanol right now. Simply too many technologies chasing too few dollars, regardless of the merits. Look for some casualties in those sectors, especially as the Mascomas, Fulcrums and Chemtex's start to wrap up the strategics that are active in the cellulosic sector.

**10.) What's the hottest technology we don't hear much about?** Hands down, the direct creation of fuels and/or low-cost sugars, directly produced by modified organisms using sunlight, CO<sub>2</sub> and water. Bypassing biomass as an intermediate, that is. So, they are bio-industrial operations, without being, specifically, in the business of bio-refining. Among these, Joule Unlimited and Proterro, making fuels and chemicals at the former, and low-cost sugars at the latter.

These are capital-G greenfield projects. It's a technology dreamed of more than achieved, and skepticism runs deep in some quarters that the engineering problems can be overcome to turn what can be achieved in the lab into something that can be achieved routinely in the field, at scale. Of course, they said that about computers, too, which were famous for instability problems in their early days.

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